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Two improvements in supervisory practice would improve the effectiveness of student teaching: development of a set of objectives derived from a theoretical model of instruction to allow for meaningful observation, recording, and reporting of student teacher performance, and provision of feedback to inform the student teacher of his performance in implementing the model. A study was conducted to determine whether, in a situation where a comprehensive model of instruction had already been developed, systematic feedback would improve the application of the model through reducing discrepancies between what a teacher believes she teaches and what is observed as being taught. Eight student teachers were randomly assigned to experimental and control groups. Each was observed eight times over a five-week period. Subjects gave a Lesson Plan to the observer prior to observation, gave him a Reconstructed Lesson after the observation, and later received the observer's tally of discrepancies between the Reconstructed Lesson and his Observation Record. The experimental group also received immediate feedback during observation. Data was treated via repeated measures and linear trend analysis. The major hypothesis, that there would be significant differences in the overall trend of discrepancy scores as a result of feedback, was supported. The hypothesis that there would be significant differences in discrepancy scores favoring the experimental group was not supported. (Findings relative to other hypotheses are reported and implications discussed.) (JS)

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Immediate and Delayed Feedback Procedures for Modifying Teaching Behavior According to a Model of Instruction[1,2]

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Introduction

The observation of student teachers is a common practice in their supervision. Such observation, however, frequently overemphasizes extraneous variables such as personality, orderliness of the room, etc. to the neglect of the teaching act itself. Where the supervisor does attempt to focus on effectiveness in instruction, feedback is often so delayed and disjointed as to be of little use to the prospective teacher. Disjointed or ineffective feedback results in large part from the generally atheoretical approach used in teacher education. Denemark and MacDonald (1967), after an intensive review of research in this area, state that the area of pre-service teacher education not only reveals a lack of theory, but in fact, it is "almost impossible to identify the theoretical basis for most of the studies reported" (p.241).

Thus it is implied that two improvements in supervisory practice are required if the student teaching experience is to become more effective:

a) a set of objectives derived from a theoretical model of instruction must be developed to allow for meaningful observation, recording and reporting of a student teacher's performance.

b) Systematic feedback must be provided to inform the student teacher of his performance in implementing the model. The necessity of immediate feed-

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back is a question explored in the research reported herein.

Since, ideally, a theoretical model of instruction and a feedback system based on it would be useful across all subject areas, the training of prospective teachers in such a model would provide a common foundation for effective feedback from supervisor to student. Further it could provide a basis for assessing teacher performance at a level well above that of opinion and according to criteria understood by both student and supervisor.

A well developed and valid model carries with it implications for what can be termed as "desirable behavior" for its users, which, in turn, can be written as behavioral objective regarding the teacher's performance as an instructor.

An example of such a model is that developed and used by J. William Moore in training teachers at Bucknell University.[1]

This model treats education as a discipline and emphasizes a research approach to instruction. Prospective teachers therefore are guided toward developing those competencies which enable them to a) identify learner characteristics of relevance to the instructional process and b) develop, test, modify and re-test hypotheses relating to the most appropriate conditions for learning. To achieve these objectives conceptual organization of instructional content is emphasized. Content may be analyzed in terms of concepts, principles or problems but all contain elements without which the concept is not complete. The elements emphasized in this model are:

1. Advance Organizers - "Introductory material at a high level of generality, abstractness and inclusiveness to serve as ideational scaffolding for more detailed material and helps bridge the gap between what the learner already knows and what he has to learn in proximateness of relevance." (Ausubel, 1968)

1. Moore, J. William, The Bucknell Plan, Xerox, Bucknell University, 1967.

2. Defining attributes - the quality or qualities which set a concept apart from all other concepts.
3. Describing attributes - qualities of a concept which it may have in common with other concepts.
4. Intra-associations - the relationships between conceptual attributes and a positive instance thereof. (The connection of a concept with its label.)
5. Inter-association - the connection between any two or more attributes of a concept.
6. Positive Instances - Examples of a concept.
7. Negative Instances - Non-example which embodies some of the attributes of the concept but not the defining ones.

Each of these elements is necessary for the understanding of the concept and is to be included in the teaching process. When they are included and effectively communicated, the learner should have the information necessary to attain the concept. Effective instruction breaks down when elements are omitted, become obscure, or are not clearly understandable to the students.

Systematic feedback used with the above described model would report to the student teacher his successful communication of the elements of the concepts being taught. Upon receipt of the information the S would have knowledge of his success at that particular teaching procedure (strategy). If feedback was not received, the S could modify his teaching immediately until his communication attempt was successful. When the element was communicated, he would receive reinforcement from knowledge of success, (Breger and McGaugh, 1965), through the feedback system.

Problem and Hypotheses

The purpose of this study was to determine whether; in a situation where a comprehensive model of instruction had already been developed, systematic feeback

would improve the application of the model through reducing discrepancies between what a teacher believes she teaches and what is observed as being taught.

Hypotheses

a. There will be significant differences in discrepancy scores favoring the delayed plus immediate feedback group (E) when compared with the delayed feedback group (C).

b. For both experimental and control groups immediate and/or delayed feedback will result over time in a significant change in both positive and negative discrepancy scores.

c. There will be significant differences in the overall trend of discrepancy scores as a result of feedback.

d. Student teacher attitude will not be unfavorably affected by the experimental procedure.

Subjects

The subjects of this study were ten college seniors in secondary education who were student teaching in the Lewisburg Area Schools, Lewisburg, Pennsylvania, and Mifflinburg Area Schools, Mifflinburg, Pennsylvania, during the last eight weeks of the spring semester, 1968. Subjects were blocked on subject taught and randomly assigned to experimental and control groups. Cooperating teachers were informed of the nature of the experiment and given the opportunity to withdraw their students from participation in the study. One teacher withdrew his student and another was randomly dropped to allow for an equal N in each group leaving a total of eight subjects for the study.

Procedure

Eight observations of each S were made during the experimental period which extended for five weeks, eliminating the first two weeks and the last week

of student teaching. To reduce variability of behavior due to different classes and subject areas, observations were conducted during the same class period each time. It was required that the S be involved in direct teaching activities with the majority of the class at least 35 minutes of the period (approximately 46 minutes in length).

The procedures used with experimental and control groups are summarized in Table 1.

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Other Instruments

An observation schedule was developed to record successfully communicated elements and key words to identify them later.

Subject perceptions of the lesson were recorded in the form of a Reconstructed Lesson. This was the original lesson plan which the S modified to reflect what he believed he taught. Included in the Reconstructed Lesson were elements of concepts taught that had not been planned and notations to indicate planned elements that had not been taught.

Delayed feedback was provided for both experimental and control groups by reporting the discrepancy between the Observation Record and the Reconstructed Lesson to the S.

A multiple-choice questionnaire was administered to each S at the end of the series of observations to compare experimental and control group attitudes toward and perceptions of the study. Ss were encouraged to comment freely on each response.

Analysis of Data

The data was collected by comparing Observation Schedules with Reconstructed Lessons in the following manner.

1. Advance Organizers, Attributes, Associations and Instances on each Reconstructed Lesson were tallied giving four scores and a total score which combined the above four.
2. Advance Organizers, Attributes, Associations, and Instances on each Observation Schedule were tallied giving four scores and a total score which combined the above four.
3. Each Reconstructed Lesson was compared to its corresponding Observation Schedule. Elements were compared for content. A positive discrepancy was counted for each element the E had observed that the S had not reported.

A Negative Discrepancy was counted for each element the S reported as having taught that the E had not observed.

This analysis took content into account. That is, it was possible for four Advance Organizers to be on the Observation Schedule, yet there could be a discrepancy if different Advance Organizers were reported by the S or E.

4. The raw discrepancy scores were converted to Percentage Discrepancy Scores to allow for comparisons between days.

$$\text{Positive - Percentage Discrepancy Score} = \frac{\text{+Discrepancy Scores}}{\text{Sum of the elements on Observation Schedule}}$$

$$\text{Negative - Percentage Discrepancy Score} = \frac{\text{-Discrepancy Scores}}{\text{Sum of the Elements on Reconstructed Lesson Plan}}$$

These scores could be interpreted as an index of the accuracy of the teachers perception of communication in applying the instructional model.

The resulting data were treated via repeated measures and linear trend analyses. (Winer, 1962)

For Hypothesis d, questionnaire results were tallied and descriptive comparisons made between experimental and control groups.

Findings and Conclusions

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Insert Tables 2 and 3

about here

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Hypothesis a -

There will be significant differences in discrepancy scores favoring the delayed plus immediate feedback group (E) when compared with the delayed feedback group (C).

In terms of both total positive discrepancy scores and total negative discrepancy scores no significant differences were found; thus these data do not provide the support for the stated hypothesis. (Table 1) This would seem to indicate that immediate feedback and delayed feedback was no more effective than delayed feedback in changing discrepancy scores. However, the significant differences which were found in the sub-category of positive advance organizers did provide some support for the hypothesis. Therefore one could conclude that immediate feedback does decrease discrepancy scores under conditions where advance organizers were involved.

The failure to find significance in the totals and other sub-categories may be a function of either prior mastery of the components of the model involved in the experiment by both experimental and control groups or failure to comprehend the model at all. An examination of the daily lesson plans would indicate that subjects in both groups had assimilated the model to a high degree.

A possible explanation of the findings in the advanced organizers sub-category as contrasted with the other sub-categories and main categories may then lie in the attending dimension. The original acquisiton of the advanced organizer

concept prior to student teaching may not have involved a high degree of arousal. Therefore the immediate feedback may have stimulated the attention necessary in this instance. If the concepts making up the other sub-categories were originally learned under high arousal conditions then the feedback provided during the experiment may have contributed little.

Another possible explanation lies in the way advance organizers are generally used in teaching. Generally they are used at the beginning of a lesson or at transitional points as the teacher moves from one concept ot another. At these times the experimental subjects would have a greater opportunity to attend to the experimenter's signals than after they became immersed in more complex teaching acts. The use of feeback with this category therefore maximizes the probability that differences would occur favoring the experimental group. This is a particularly attractive explanation for the findings regarding this hypothesis since the subjects were all student teachers, inexperienced in the classroom and under some emotional stress. The tension may have reduced their ability to attend to and cognitively assimilate the immediate feedback signals given while they were more involved in instruction and classroom management problems.

Hypothesis b -

For both experimental and control groups, immediate feedback and delayed feedback will result over time in a significant change in both positive and negative discrepancy scores.

As can be observed in Table 1, significant changes were observed for the groups in both positive and negative total discrepancy scores. Although significant differences were observed in the sub-categories for positive attributes and positive associations,no differences were noted in any of the other sub-categories making up either the positive total or negative total categories. Thus, when consideration was given to time, significant changes in discrepancy scores did

occur.

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Insert Figures 1, 2, & 3

about here

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The significant interaction effect observed under negative total and negative associations categories would support the first hypothesis that discrepancy scores are a function of immediate feedback when time is considered. For purposes of interpretation it can be observed in Figure 2 and 3 that over time the discrepancies of negative totals and negative associations for controls tended to increase while the discrepancy scores for the experimental group tended to decrease. An explanation for this interaction effect may be that, with immediate feedback subjects are more likely to attend to what they have taught or not taught, whereas the absence of such feedback may lead to self-delusion regarding ones teaching procedures. In other words, it could be argued that a decrease in the Positive Discrepancy Scores would show that the S has become more aware of his teaching, or at least feels freer to credit himself (and does so accurately) with more elements that are taught successfully. Negative Discrepancy Scores, however, which show that the Student-teacher believes she is communicating more than is observed, may decrease or not independently of the Paired Positive Discrepancy Score since a different type of self-perception is involved. The ego involvement in admitting one is not as successful as one might formerly have thought or desiredto believe is not the same as that involved in looking upon oneself as more successful than previously reported.

Further evidence supporting this explanation may be found by observing Table 1 where no significant differences in interaction were found for either the positive total category or for any sub-category under it. Since reinforcing what one does

positively is possibly not as ego threatening, a reduction in discrepancy over time would be expected. Although there was generally a reduction in positive discrepancy scores over time for both experimental and control groups, as can be observed in Figure 1, there tends to be a greater reduction in discrepancy for the immediate feedback goup. If the treatments had been continued for a longer period of time it is possible that the effects of the experimental treatment might have been great enough to secure significant differences.

Hypothesis c -

There will be significant differences in the overall trend of discrepancy scores as a result of feedback.

As can be observed in Table 2, significant differences were obtained in both positive total and negative total categories. Thus the major hypothesis was supported. This trend is consistent with changes in discrepancy scores discussed previously.

Considering the observed interaction, there were again significant differences in trend between experimental and control groups in terms of the negative total category and the negative assocaiation sub-category. As in the analysis described previously there were no significant differences in interaction for the positive discrepancy total or sub-categories. The discrepancy scores reflecting accuracy in perceiving one's own communication success, decreased at a more rapid rate in the group receiving immediate feedback than in the group receiving delayed feedback.

Hypothesis d -

Student teacher attitudes will not be unfavorably affected by the experimental procedure.

Data from both the Subject Questionnaire and from personal interviews were handled in descriptive form. Results indicated that student teachers in the experimental situation felt no less comfortable in the observation situation than did the control Ss.

Ss reported that they generally agreed with the Es classification of the elements taught into one of the four defined categories. In regard to the question dealing with agreement with Es classification, a total of 16 responses were called for from the experimental group. In 11 instances there was 99% agreement with the classification; in one instance, 66% agreement; and in the remaining four, Ss replied that they had not noticed and therefore could not accurately judge. The extensive use of the 99% category validates some important assumptions that weremade at the beginning of the experiment. First, that the instructional model used to classify the teaching behavior of the Ss was one that was understandable to the Ss. They were able to classify their own behavior into categories useful for the successful communication of concepts being taught as they were teaching. Second, the verbalized agreement with the E's classification can perhaps be considered a crude measure of observer reliability. (This classification reliability should not be confused with communication variables measured by discrepancy scores.) It is apparent from the comparison of E's ranking in the experimental and control groups that the E was perceived as more helpful to the experimental group. From responses to other items in the instrument, it is evident that this difference was a function of the immediate feedback given.

The educational significance, as distinguished from the statistical significance of these findings, is worthy of emphasis here. Certainly any conclusions drawn from this work must be of a very provisional nature because of the size of the population used and the limited time exposure to the treatments. Nevertheless, findings such as those discussed in this paper indicate that one can systematically modify both observed student teacher performance and his verbalized description of this performance in carrying out "instructional sequencing". This in turn, points up the crucial role a theoretical model of instruction plays in improving teacher competency. Without such a model to define expected performance, both the

college supervisor and the student teacher are reduced to the level of opinion in discussing alternate teaching techniques or worse yet, the supervisor tends to place undue weight on factors which are quite peripheral to the prospective teachers adeptness in instruction. A model of instruction, thoroughly understood by both student and supervisor, provides for reliable observation, clarifies the goals in which both are interested, and gives a basis for evaluation of the students competency in attaining those goals. As this study indicates, at least in a preliminary way, a model also permits the application of systematic procedures, in this case feedback, to modify teaching behavior so that good teaching becomes much less a chance occurrence based on some combination of talent, personality and knowledge over which we seemingly have little control. Immediate feedback was an important factor in reducing discrepancies and shaping instructional behavior according to the model used in this study. The concepts of positive and negative discrepancy reduction introduced in this study may also prove to be vehicles for more elaborate research into a more theoretical and systematic approach to the preparation of teachers.

Table 1

Summary of Research Procedures

	Experimental		Control
1.	S planned lesson	1.	S planned lesson
2.	Lesson plan given to E prior to observation.	2.	Lesson plan given to E prior to observation.
3.	S taught, E observed, provided immediate feedback, and recorded.	3.	S taught, E observed and recorded only.
4.	S reconstructed lesson.	4.	S reconstructed lesson.
5.	Reconstructed Lesson given to E by end of day.	5.	Reconstructed lesson given to E by end of day.
6.	E compared reconstructed lesson to observation record and tallied positive and negative discrepancies for each element.	6.	E compared reconstructed lesson to observation record and tallied positive and negative discrepancies for each element.
7.	E reported differences to S.	7.	E reported differences to S.

Repeated Measures

Summary Table 2

Source	Positive Total F	Positive Adv. Org. F	Positive Attributes F	Positive Assoc. F	Positive Instances F	DF	Negative Total F	Negative Adv. Org. F	Negative Attributes F	Negative Assoc. F	Negative Instances F
Between Ss											
A (treatment)	n.s.	14.77*	n.s.	n.s.	n.s.	1/4	n.s.	n.s.	n.s.	n.s.	n.s.
A (S)											
Within Ss											
B (observation)	4.16*	n.s.	2.54*	3.25*	n.s.	7/42	2.54*	n.s.	n.s.	n.s.	n.s.
A×B	n.s.	n.s.	n.s.	n.s.	n.s.	7/42	2.32*	n.s.	n.s.	2.57*	n.s.
B×S(A)											

** p<.01

* p<.05

+ p<.10

df	F	
7/40	.01	3.12
	.05	2.25
	.10	1.87

df	F	
1/4	.01	21.2
	.05	7.71
	.10	4.54

Trend Analysis

Summary Table 3

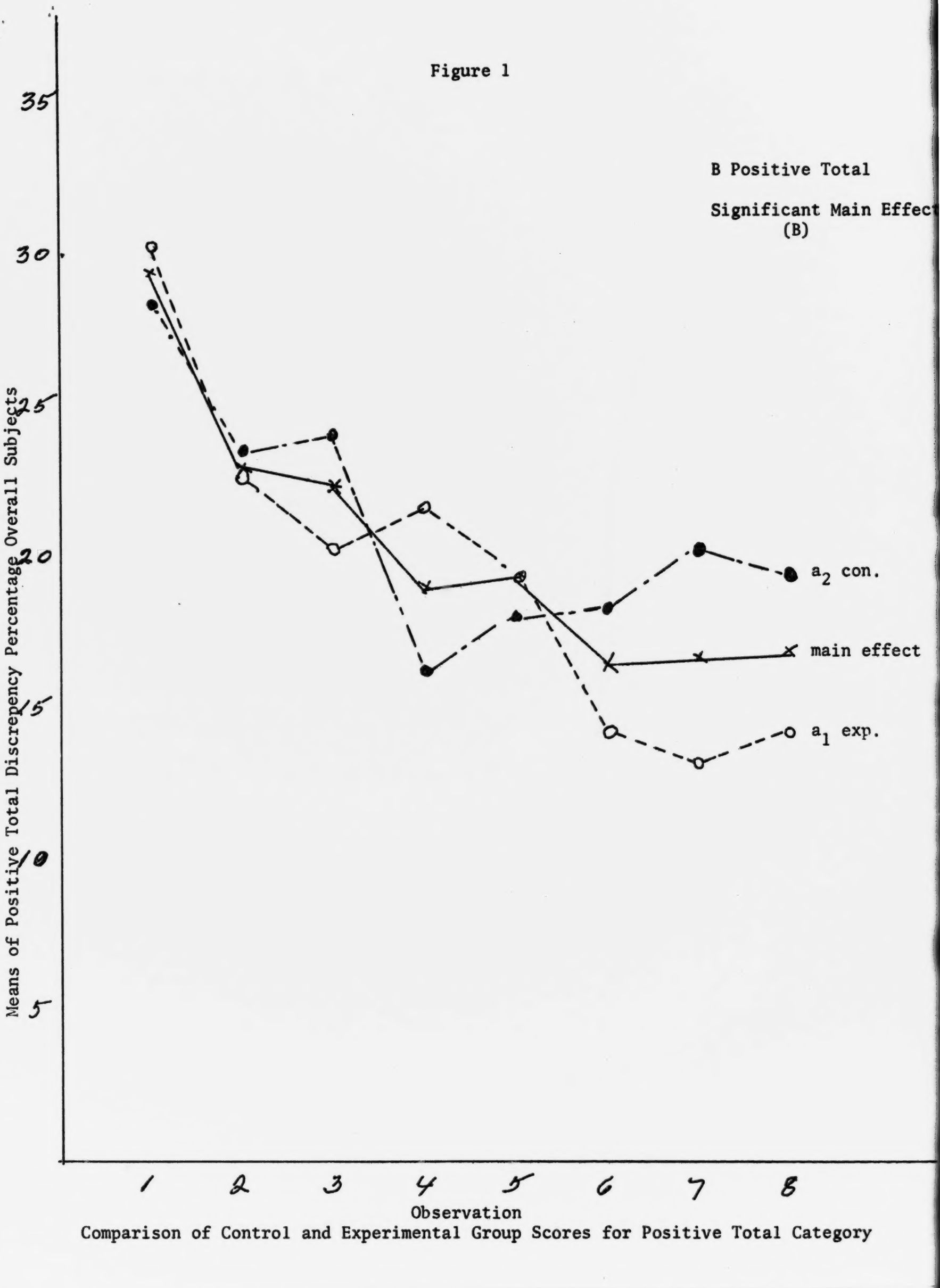
Source	Positive Total F	Positive Adv. Org. F	Positive Attributes F	Positive Assoc. F	Positive Instances F	Df	Negative Total F	Negative Adv. Org. F	Negative Attributes F	Negative Assoc. F	Negative Instances F
Within Ss (Linear)											
B	13.59*	n.s.	n.s.	n.s.	n.s.	1	8.84*	n.s.	n.s.	n.s.	n.s.
A×B	n.s.	n.s.	n.s.	n.s.	n.s.	1	4.93+	n.s.	n.s.	7.37*	n.s.
B×S(A)						6					

* $p<.05$

\+ $p<.10$

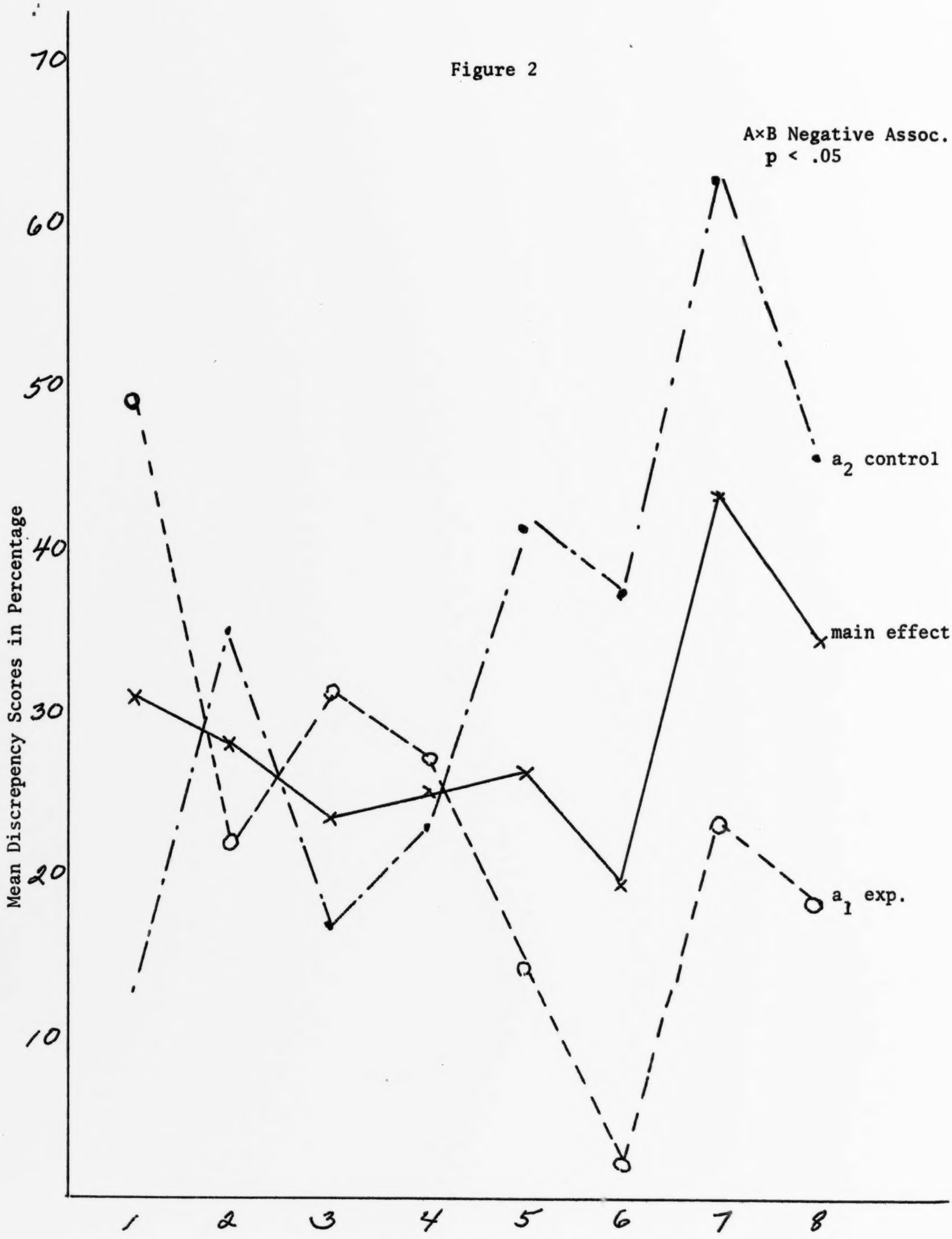
df	p<	F	
1/6	.01	13.7	**
	.05	5.99	*
	.10	3.78	+

Figure 1



Comparison of Control and Experimental Group Scores for Positive Total Category

Figure 2



Comparison of Control and Experimental Group Scores for the Negative Association Categor

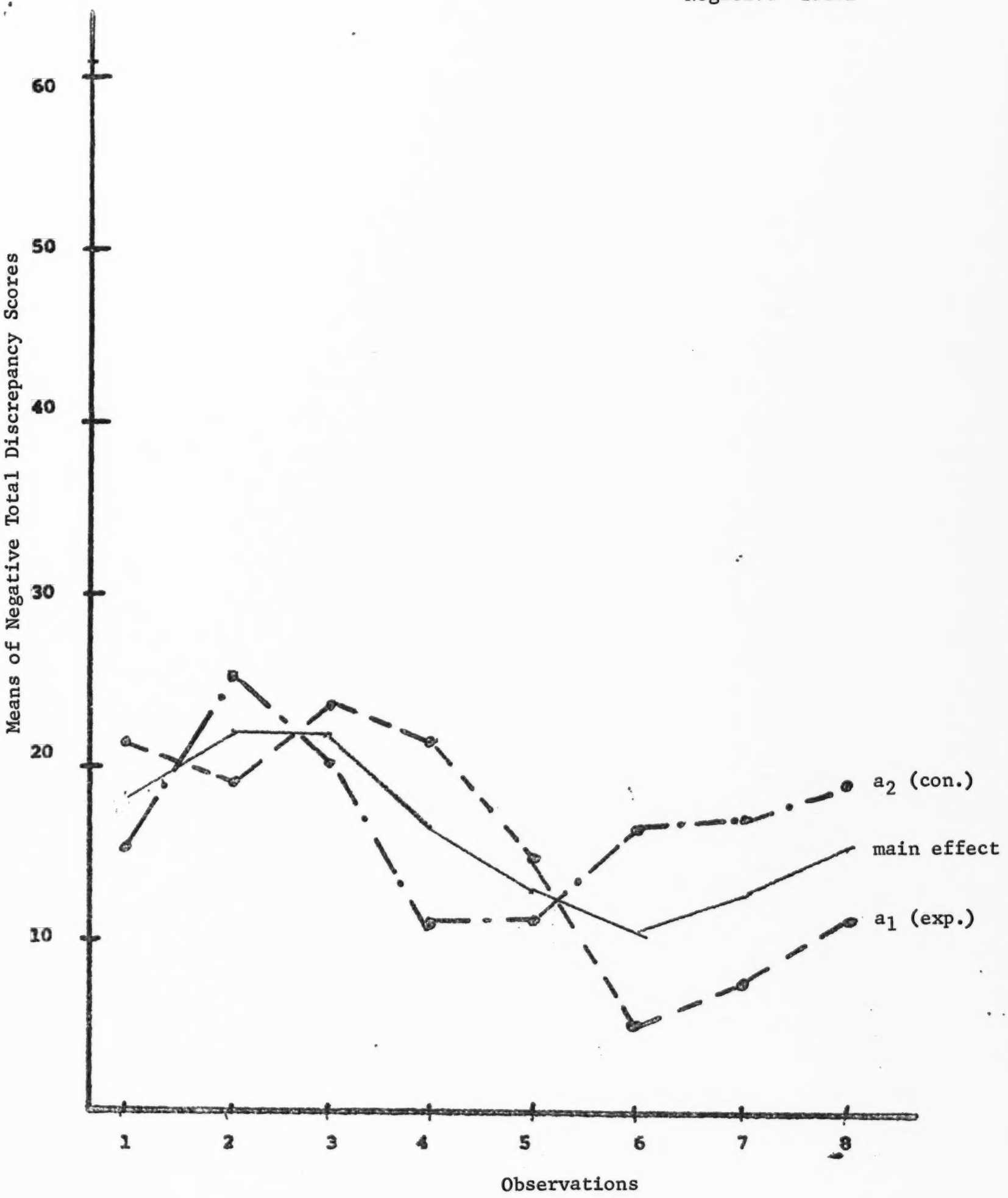

Means of Negative Total Discrepancy Scores
60
50
40
30
20
10
1
2
3
4
5
6
7
8
Observations
a_2 (con.)
main effect
a_1 (exp.)

Figure 3

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